REPORT ON COMPARATIVE ANALYSIS

Chemical Recovery Systems, Inc.
142 Locust Street
Elyria, OH 44035
CERCLIS ID# OHD 057 001 810

Revision 0
July 2004

Prepared for:
CRS Site Group

Prepared by:

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19101 Villaview Road, Suite 100
Cleveland, Ohio 44119-3088

Parsons Job No. 741012

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1.0 INTRODUCTION

1.1 Introduction

This Report on Comparative Analysis is being prepared in fulfillment of the requirements of the Administrative Order on Consent (AOC) entered by the United States Environmental Protection Agency (U.S. EPA) with the CRS Site Group (Respondents) on May 29, 2002. The Report follows and builds from previous deliverables submitted by the CRS Site Group, including: the Site Characterization Summary; the Memorandum on Remedial Action Objectives; and the Memorandum on Development and Preliminary Screening of Alternatives, Assembled Alternatives, Screening Results and Final Screening. These documents have been reviewed by USEPA and we have had the benefit of the agency's comments as we prepare the Report on Comparative Analysis. As such, the Comparative Analysis addresses the remedial alternatives that survived the preliminary screening of alternatives.

1.2 Reason for Comparative Analysis

A Comparative Analysis is conducted after the alternatives are individually assessed. The purpose of the Comparative Analysis is to evaluate the relative performance of each alternative in relation to each specific evaluation criteria. There are nine evaluation criteria, two of which are not evaluated until the State and Community have been able to comment on the Feasibility Study report.

1.3 Evaluation Criteria

The nine evaluation criteria that have been developed to address the requirements and considerations required under the Comprehensive Environmental Response, Compensation, & Liability Act (CERCLA) and to address additional technical and policy considerations that are considered to be important for selecting the remedial alternative. The evaluation criteria are:

- Overall Protection of Human Health and the Environment – The assessment against this criterion describes how the alternative, as a whole, achieves and maintains protection of human health and the environment.

- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) – The assessment against this criterion describes how the alternative complies with ARARs, or if a waiver is required and how it is justified. The assessment also addresses other information from advisories, criteria, and guidance that the lead and support agencies have agreed is "to be considered."
- Long-term Effectiveness and Permanence – The assessment of alternatives against this criterion evaluates the long-term effectiveness of alternatives in maintaining protection of human health and the environment after response objectives have been met.
- Reduction of Toxicity, Mobility, and Volume – The assessment against this criterion evaluates the anticipated performance of the specific treatment technologies an alternative may employ.
- Short-term Effectiveness – The assessment against this criterion examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation of a remedy until response objectives have been met.
- Implementability – This assessment evaluates the technical and administrative feasibility of alternatives and the availability of required goods and services.
- Cost – This assessment evaluates the capital and operation and maintenance (O&M) costs of each alternative.

The final two criteria, State (or support agency) Acceptance and Community Acceptance, will be evaluated after the RI/FS report has been released to the general public in accordance with the Statement of Work and the proposed plan will be addressed as a final decision is being made and the ROD is being prepared. The criteria are as follows:

- State Acceptance – This assessment reflects the State's apparent preferences among or concerns about alternatives.
- Community Acceptance – This assessment reflects the community's apparent preferences among or concerns about alternatives.

2.0 INDIVIDUAL ANALYSIS OF ALTERNATIVES

2.1 Alternative 1 – No Action

2.1.1 Description of Alternative

This alternative provides a baseline for comparing the other alternatives. No remedial actions would be implemented as part of the No Action Alternative.

2.1.2 Overall Protection of Human Health and the Environment

The risks would be as determined in the baseline risk assessment, with no reduction in risk from this alternative as there would not be any remedial actions implemented. Chemicals of concern (COCs) for soil pathways identified at the site (soil ingestion, soil dermal contact, soil inhalation, and soil volatilization to indoor air) include lead, Aroclor 1242, Aroclor 1254, benzo(a)pyrene, benzene, tetrachlorethene, and trichloroethene. Soil-to-groundwater leaching in the northwest corner of the Site only is also a potential pathway of concern under future site conditions. The COCs for the soil-to-groundwater leaching pathway include aluminum, antimony, arsenic, cadmium, copper, lead, selenium, zinc, polychlorinated biphenyls (PCBs), benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k) fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, benzene, ethylbenzene, methylene chloride, tetrachloroethene, toluene, trichloroethene, vinyl chloride, and xylenes.

The results of the soil screening benchmark comparison identified the following potential ecological compounds of concern (PECOCs): aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, zinc, 1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene (total, cis and trans isomers), acetone, benzene, chloroethane, ethylbenzene, methylene chloride, tetrachloroethene, toluene, trans-1,3-dichloropropene, trichloroethene, vinyl chloride, xylenes, 2,4-dimethylphenol, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, carbazole, chrysene, dibenzofuran, naphthalene, phenanthrene, and pyrene.

2.1.3 Compliance with ARARs

As no remedial action is being performed for this Alternative, it does not comply with the applicable chemical specific ARARs for COCs above target levels.

2.1.4 Long-Term Effectiveness and Permanence

This alternative provides no long-term management measures. Most of the volatile organic compounds (VOCs) and semi-volatile compounds (SVOCs) will degrade and dissipate over time, however the metal COCs and PECOCs will not.

2.1.5 Reduction of Toxicity, Mobility, and Volume

This alternative provides no reduction in toxicity, mobility, or volume of the COCs and PECOCs other than natural degradation processes.

2.1.6 Short-Term Effectiveness

There would be no additional risks to the community, the workers, or the environment as a result of this alternative being implemented.

2.1.7 Implementability

There are no implementability concerns, since no action is being taken for this Alternative.

2.1.8 Cost

There would be no cost associated with this alternative since no action would be taken.

2.2 Alternative 2 – Soil Cap

2.2.1 Description of Alternative

This alternative (Figure 1) consists of a soil cap (Figure 2, Detail 5) that would provide two feet of cover over a two-acre portion of the Site for which a contact cover is sufficient to eliminate pathways of concern. The remaining 0.5 acres of the site would have a geosynthetic cap (Figure 2, Detail 4) to address the additional need for an infiltration barrier cap in this area. The two existing buildings are assumed to be demolished and concrete and brick crushed and used on Site as backfill. Metal, glass,

and asbestos containing debris is assumed to be disposed of offsite. The wood chips and other vegetation debris in the former aboveground storage tank area would be disposed of offsite. The slope to the East Branch of the Black River ("River") would be regraded and have erosion protection (riprap) installed. Penetrations to the storm sewer, which is the property of the City of Elyria, would be sealed off. Repair of the storm sewer would be coordinated with the City of Elyria. A fence would be placed around the entire Site perimeter. A deed restriction would be placed on the Site to limit the future use of the Site to commercial/industrial type applications that meet the assumptions in the baseline risk assessment.

2.2.2 Overall Protection of Human Health and the Environment

The two-foot thick soil contact cap and the geosynthetic cap in the northwest corner of the Site would be protective of human health by eliminating exposure to the contaminated soil and by preventing precipitation infiltration, and subsequent leaching of COCs through the soil and into the groundwater in the northwest corner of the Site.

2.2.3 Compliance with ARARs

A review was conducted to determine the regulations that are applicable or relevant and appropriate to the remediation of the site. Both federal and state environmental and public health requirements were considered. In addition, this section presents an identification of federal and state criteria, advisories, and guidance that could be used in evaluating the remedial alternatives.

Chemical Specific ARARs

Site specific target levels have been developed with a risk assessment. As indicated in the Memorandum on Remedial Action Objectives, the chemicals of concern (COCs) are in soil only, and there are no listed COCs in groundwater. The U.S. EPA's Risk Assessments Guidance for Superfund: Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments (RAGS-D)) was used when developing the Human Health Risk Assessment for this Site. The U.S. EPA's Ecological Risk Assessment Guidance for Superfund (E-RAGS): Process for

Designing and Conducting Ecological Risk Assessments was used to prepare the ecological risk assessment report for the Site. The proposed remedy will eliminate exposure pathways for all COCs above the risk-based target levels.

Location Specific ARARs

The activities associated with placing the various proposed capping technologies will require work adjacent to the River, and within the floodplain of this waterway. Therefore, the following are possible ARARs.

- Section 10 of the River and Harbors Act of 1899 (33 USC 403) prohibits the obstruction or alteration of any navigable water in the United States (i.e., the East Branch of the Black River). The proposed remedy will comply with this ARAR.
- Clean Water Act (CWA) of 1977 (33 USC 1344, 33 CFR 322). Section 404 of the CWA establishes limitations on work within surface waters or wetland areas. The proposed remedy will comply with this ARAR.
- Executive Order 11988 40 CFR 6: Similar to the CWA, this ARAR requires that construction activities avoid long and short term adverse impacts associated with actions in wetlands or floodplain areas. The proposed remedy will comply with this ARAR.

Action Specific ARARs

The proposed remedial action includes the demolition and removal of existing site buildings, and the placement of a cap above the impacted soil area to prevent human exposure. Potential Action-Specific ARARs include:

- The Clean Air Act (40 CFR 61) under NESHAPs regulates emissions of asbestos. The demolition of the existing site buildings will comply with this ARAR by the removal and disposal of any asbestos containing materials.
- In addition to the Clean Air Act, the State of Ohio also regulates the removal and handling of asbestos waste under OAC 3745-20. Any associated asbestos removal and disposal will comply with this ARAR.

Other Criteria or Guidelines to be considered (TBC)

- Occupational Safety and Health Act (OSHA) of 1970 (29 USC 651), and OSHA requirements for workers engaged in response or other hazardous waste operations. This TBC will be adhered to during all phases of site remedial activities.

- The State of Ohio under OAC 3745-9-10 has regulations pertaining to the sealing and abandonment of unused wells. Monitoring wells with no projected future use on site will be sealed and abandoned in accordance with this rule

2.2.4 Long-Term Effectiveness and Permanence

For this alternative to remain effective, the cap must be maintained. Maintenance of the soil cap to ensure protection against erosion or animal burrows would be required. Maintenance of the geosynthetic cap to ensure the drainage layer is functioning, and the top cover soil is not eroding or animals burrowing down to the geosynthetic would be required. Because this alternative would leave hazardous substances onsite, a USEPA review would be conducted every five years to ensure the remedy continues to provide adequate protection of human health and the environment in accordance with CERCLA §121(c).

2.2.5 Reduction of Toxicity, Mobility, and Volume

This alternative would provide no reduction in the toxicity, mobility, or volume of the contaminated material. The contaminated soil would remain onsite and be covered by a soil cap and a geosynthetic cap. The geosynthetic cap would reduce mobility of the COCs in the soil. Natural degradation may reduce the toxicity and volume of the contaminated material.

2.2.6 Short-Term Effectiveness

Dust production during the short term may be temporarily increased due to demolition activities and regrading for cap construction. Dust generation would be minimized through engineering controls to be implemented by the Contractor and as

specified in the construction documents. Environmental impacts would be immediately eliminated upon construction of the soil and geosynthetic caps.

2.2.7 Implementability

The soil cap and the geosynthetic cap would be easy to construct. An estimated 11,500 cubic yards of soil would need to be brought onsite and spread across the Site to create the soil cap. The geosynthetic cap materials (geomembrane and geogrid drainage layer) are readily available from several suppliers. The soil cap and the soil over the geomembrane cap would then be seeded and would be periodically maintained. Monitoring for signs of failure or need of repair may be readily accomplished. Additional future actions are not prohibited from being implemented by this action.

2.2.8 Cost

The capital cost for construction of this Alternative is estimated to be $762,000. The 30-year present net worth including and annual OM&M cost of $50,000 is $1,325,000.

2.3 Alternative 3 – Stone Cap

2.3.1 Description of Alternative

This alternative (Figure 1) consists of a stone cap (Figure 2, Detail 3) that would cover the two-acre portion of the Site, which can have a contact cover and would be a minimum of one-foot thick, underlain by a geotextile fabric. The other 0.5 acres of the site would have a geosynthetic cap (Figure 2, Detail 4) to address the need for a infiltration barrier cap. The two existing buildings are assumed to be demolished and concrete and brick crushed and used on Site as backfill. Metal, glass, and asbestos containing debris is assumed to be disposed of offsite. The wood chips and other vegetation debris in the former aboveground storage tank area would be disposed of offsite. The slope to the River would be regraded and have erosion protection (riprap) installed. Penetrations to the storm sewer, which is the property of the City of Elyria, would be sealed off. Repair of the storm sewer would be coordinated with the City of Elyria. A fence would be placed around the entire Site perimeter. A deed restriction

would be placed on the Site to limit the future use of the Site to commercial/industrial type applications that meet the assumptions in the baseline risk assessment.

2.3.2 Overall Protection of Human Health and the Environment

The one-foot thick stone cap and the geosynthetic cap in the northwest corner of the Site would be protective of human health by eliminating exposure to the contaminated soil and by preventing precipitation infiltration, and subsequent leaching of COCs through the soil and into the groundwater in the northwest corner of the Site.

2.3.3 Compliance with ARARs

Chemical Specific ARARs

The chemical specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Location Specific ARARs

The location specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Action Specific ARARs

The action specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Other Criteria or Guidelines to be considered (TBC)

The TBC for this proposed alternative are identical to those in Section 2.2.3.

2.3.4 Long-Term Effectiveness and Permanence

For this alternative to remain effective, the cap must be maintained. Maintenance of the stone cap to ensure protection against loss of cover thickness or animal burrows would be required. Maintenance of the geosynthetic cap to ensure the drainage layer is functioning, and the top cover soil is not eroding or animals burrowing down to the geosynthetic layer would be required. Because this alternative would leave hazardous substances onsite, a USEPA review would be conducted every five years to ensure the

remedy continues to provide adequate protection of human health and the environment in accordance with CERCLA §121(c).

2.3.5 Reduction of Toxicity, Mobility, and Volume

This alternative would provide no reduction in the toxicity, mobility, or volume of the contaminated material. The contaminated soil would remain onsite and be covered by a stone cap and a geosynthetic cap. The geosynthetic cap would reduce mobility of the COCs in the soil. Natural degradation may reduce the toxicity and volume of the contaminated material.

2.3.6 Short-Term Effectiveness

Dust production during the short term may be temporarily increased due to demolition activities and regrading for cap construction. Dust generation would be minimized through engineering controls to be implemented by the Contractor and as specified in the construction documents. Environmental impacts would be immediately eliminated upon construction of the stone and geosynthetic caps.

2.3.7 Implementability

The stone and geotextile caps would be easy to construct. An estimated 8,600 square yards of stone and geotextile would need to be brought onsite and placed across the Site to create the stone cap. The geotextile would prevent plants from growing through it and would act as a barrier to animals trying to burrow through the stone. The geosynthetic cap materials (geomembrane and geogrid drainage layer) are readily available from several suppliers. The soil over the geomembrane cap would be seeded and would be periodically maintained. Monitoring for signs of failure or need of repair may be readily accomplished. Additional future actions are not prohibited from being implemented by this action.

2.3.8 Cost

The capital cost for construction of this Alternative is estimated to be $746,000. The 30-year present net worth including and annual OM&M cost of $43,000 is $1,230,000.

2.4 Alternative 4 – Asphalt Cap

2.4.1 Description of Alternative

This alternative (Figure 1) consists of an asphalt cap (Figure 2, Detail 1) that would cover the two-acre portion of the Site, which can have a contact cover. The asphalt cap would consist of a type 304 stone six inches thick base and four inches of asphalt. The other 0.5 acres of the site would have a geosynthetic cap (Figure 2, Detail 4) to address the need for an infiltration barrier cap. The two existing buildings are assumed to be demolished and concrete and brick crushed and used on Site as backfill. Metal, glass, and asbestos containing debris is assumed to be disposed of offsite. The wood chips and other vegetation debris in the former aboveground storage tank area would be disposed of offsite. The slope to the River would be regraded and have erosion protection (riprap) installed. Penetrations to the storm sewer, which is the property of the City of Elyria, would be sealed off. Repair of the storm sewer would be coordinated with the City of Elyria. A fence would be placed around the entire Site perimeter. A deed restriction would be placed on the Site to limit the future use of the Site to commercial/industrial type applications that meet the assumptions in the baseline risk assessment.

2.4.2 Overall Protection of Human Health and the Environment

The asphalt cap and the geosynthetic cap in the northwest corner of the Site would be protective of human health by eliminating exposure to the contaminated soil and by preventing precipitation, infiltration, and subsequent leaching of COCs through the soil and into the groundwater in the northwest corner of the Site.

2.4.3 Compliance with ARARs

Chemical Specific ARARs

The chemical specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Location Specific ARARs

The location specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Action Specific ARARs

The action specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3, with the exception of the addition of the following:

- The Ohio Environmental Protection Agency (OEPA) Division of Emergency and Remedial Response has issued "Asphalt Covers to Prevent Leaching at Industrial Sites" and "Use of Asphalt Covers over Contaminated Soil" (DERR-00-TDCE-001 and -004) to be considered when using an asphalt cap as a corrective action measure. These technical decision compendiums will be adhered to if the use of an asphalt cap is selected.

Other Criteria or Guidelines to be considered (TBC)

The TBC for this proposed alternative are identical to those in Section 2.2.3.

2.4.4 Long-Term Effectiveness and Permanence

For this alternative to remain effective, the cap must be maintained. Maintenance of the asphalt cap would be required as cracks develop. Maintenance of the geosynthetic cap to ensure the drainage layer is functioning, and the top cover soil is not eroding or animals burrowing down to the geosynthetic would be required. Because this alternative would leave hazardous substances onsite, a USEPA review would be conducted every five years to ensure the remedy continues to provide adequate protection of human health and the environment in accordance with CERCLA §121(c).

2.4.5 Reduction of Toxicity, Mobility, and Volume

This alternative would provide no reduction in the toxicity, mobility, or volume of the contaminated material. The contaminated soil would remain onsite and be covered by an asphalt cap and a geosynthetic cap. The asphalt cap and the geosynthetic cap would reduce mobility to the COCs in the soil. Natural degradation may reduce the toxicity and volume of the contaminated material.

2.4.6 Short-Term Effectiveness

Dust production during the short term may be temporarily increased due to demolition activities and regrading for cap construction. Dust generation would be minimized through engineering controls to be implemented by the Contractor and as specified in the construction documents. Environmental impacts would be immediately eliminated upon construction of the asphalt and geosynthetic caps.

2.4.7 Implementability

The asphalt and geosynthetic caps would be easy to construct. An estimated 8,600 square yards of stone (6" thick) and asphalt (4" thick) would need to be brought onsite and placed across the Site to create the asphalt cap. The geosynthetic cap materials (geomembrane and geogrid drainage layer) are readily available from several suppliers. The soil over the geomembrane cap would be seeded and would be periodically maintained. An asphalt cap does not self-heal and would require inspection and repair of cracks. The asphalt cap is ideal however, as a parking lot or storage area. Monitoring for signs of failure or need of repair may be readily accomplished. Additional future actions are not prohibited from being implemented by this action.

2.4.8 Cost

The capital cost for construction of this Alternative is estimated to be $776,000. The 30-year present net worth including and annual OM&M cost of $50,000 is $1,339,000.

2.5 Alternative 5 – Concrete Cap

2.5.1 Description of Alternative

This alternative (Figure 1) consists of a concrete cap (Figure 2, Detail 2) that would cover the two-acre portion of the Site, which can have a contact cover. The concrete cap would consist of a type 304 stone six inches thick base and four inches of concrete. The other 0.5 acres of the site would have a geosynthetic cap (Figure 2, Detail 4) to address the need for a infiltration barrier cap. The two existing buildings are assumed to be demolished and concrete and brick crushed and used on Site as backfill.

Metal, glass, and asbestos containing debris is assumed to be disposed of offsite. The wood chips and other vegetation debris in the former aboveground storage tank area would be disposed of offsite. The slope to the River would be regraded and have erosion protection (riprap) installed. Penetrations to the storm sewer, which is the property of the City of Elyria, would be sealed off. Repair of the storm sewer would be coordinated with the City of Elyria. A fence would be placed around the entire Site perimeter. A deed restriction would be placed on the Site to limit the future use of the Site to commercial/industrial type applications that meet the assumptions in the baseline risk assessment.

2.5.2 Overall Protection of Human Health and the Environment

The concrete cap and the geosynthetic cap in the northwest corner of the Site would be protective of human health by eliminating exposure to the contaminated soil and by preventing precipitation, infiltration, and subsequent leaching of COCs through the soil and into the groundwater in the northwest corner of the Site.

2.5.3 Compliance with ARARs

Chemical Specific ARARs

The chemical specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Location Specific ARARs

The location specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Action Specific ARARs

The action specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Other Criteria or Guidelines to be considered (TBC)

The TBC for this proposed alternative are identical to those in Section 2.2.3.

2.5.4 Long-Term Effectiveness and Permanence

For this alternative to remain effective, the cap must be maintained. Maintenance of the geosynthetic cap to ensure the drainage layer is functioning, and the top cover soil is not eroding or animals burrowing down to the geosynthetic would be required. Because this alternative would leave hazardous substances onsite, a USEPA review would be conducted every five years to ensure the remedy continues to provide adequate protection of human health and the environment in accordance with CERCLA §121(c).

2.5.5 Reduction of Toxicity, Mobility, and Volume

This alternative would provide no reduction in the toxicity, mobility, or volume of the contaminated material. The contaminated soil would remain onsite and be covered by a concrete cap and a geosynthetic cap. The concrete cap and the geosynthetic cap would reduce mobility to the COCs in the soil. Natural degradation may reduce the toxicity and volume of the contaminated material.

2.5.6 Short-Term Effectiveness

Dust production during the short term may be temporarily increased due to demolition activities and regrading for cap construction. Dust generation would be minimized through engineering controls to be implemented by the Contractor and as specified in the construction documents. Environmental impacts would be immediately eliminated upon construction of the concrete and geosynthetic caps.

2.5.7 Implementability

The concrete cap would be easy to construct. An estimated 8,600 square yards of stone (6" thick) and concrete (4" thick) would need to be brought onsite and placed across the Site to create the concrete cap. The geosynthetic cap materials (geomembrane and geogrid drainage layer) are readily available from several suppliers. The soil over the geomembrane cap would be seeded and would be periodically maintained. The concrete cap does not self-heal would require inspection and repair of cracks. The concrete cap is ideal however, as a parking lot or storage area. Monitoring for signs of

failure or need of repair may be readily accomplished. Additional future actions are not prohibited from being implemented by this action.

2.5.8 Cost

The capital cost for construction of this Alternative is estimated to be $822,000. The 30-year present net worth including and annual OM&M cost of $50,000 is $1,385,000.

2.6 Alternative 6 – Excavation and Disposal

2.6.1 Description of Alternative

The contaminated soil would be excavated and hauled off-site for disposal at a non-hazardous or a hazardous disposal location (depending on analysis of soil) for disposal. The Site would then be backfilled with clean fill and seeded. The limits of the contaminated soil would be determined by establishing cleanup levels for the contaminants and setting limits for excavation and testing at those limits to verify that the cleanup levels have been achieved. If the cleanup limits have not been achieved, further soil excavation would be required until the cleanup levels are reached at the limits of the excavation. The two existing buildings are assumed to be demolished and concrete and brick crushed and used on Site as backfill. Metal, glass, and asbestos containing debris is assumed to be disposed of offsite. The wood chips and other vegetation debris in the former aboveground storage tank area would be disposed of offsite. The slope to the River would be regraded and have erosion protection (riprap) installed. Penetrations to the storm sewer, which is the property of the City of Elyria, would be sealed off. Repair of the storm sewer would be coordinated with the City of Elyria. A fence would be placed around the entire Site perimeter. A deed restriction would be placed on the Site to limit the future use of the Site to commercial/industrial type applications that meet the assumptions in the baseline risk assessment.

2.6.2 Overall Protection of Human Health and the Environment

This alternative would be protective of human health and the environment by eliminating exposure to the contaminated soil (removing it from the Site). In the short

term, excavating the contaminated soil would increase the airborne exposure risk by volatilizing organic contaminants and generating dust that could contain other contaminants. This alternative would also increase the risk of exposure from accidents or spills for those who live or work along the truck route used to move the contaminants to an appropriate disposal site. Finally, the ultimate disposal site for the contaminants will continue to pose some risk to human health and the environment, albeit in a regulated and licensed disposal site.

2.6.3 Compliance with ARARs

Chemical Specific ARARs

The chemical specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Location Specific ARARs

The location specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3.

Action Specific ARARs

The action specific ARARs for this proposed alternative are identical to those identified in Section 2.2.3 except for the addition of the following:

- The Toxic Substances Control Act (TSCA) regulates the handling and disposal of polychlorinated biphenyls under 40 CFR Part 761. This ARAR is applicable since some of the impacted soils to be excavated at the site contained concentrations of PCBs which exceeded 50 parts per million.
- Department of Transportation (DOT) hazardous material transport requirements regulate how contaminated materials may need to be handled, placarded and transported. This ARAR will be adhered to for all transported material leaving the site.

Other Criteria or Guidelines to be considered (TBC)

The TBC for this proposed alternative are identical to those in Section 2.2.3.

2.6.4 Long-Term Effectiveness and Permanence

This alternative is effective in the long-term as it has removed the contaminated soil to levels below the action limits at the site. Permanence is dependant upon the effectiveness of the ultimate offsite disposal site.

2.6.5 Reduction of Toxicity, Mobility, and Volume

This alternative would provide no reduction in the toxicity, mobility, or volume of the contaminated material. The contaminated soil would be removed and disposed of off-site.

2.6.6 Short-Term Effectiveness

Dust production during the short term of the construction activities may be temporarily increased due to demolition activities and excavation of the contaminated soils. Dust generation would be minimized through engineering controls required to be implemented by the Contractor specified in the construction documents. The onsite environmental impacts would be immediately eliminated upon removal of the contaminated soils. A large number of vehicles would be hauling contaminated soil out of the Site and bringing clean fill into the Site. Transportation-related risks would increase in the short term.

2.6.7 Implementability

The construction is estimated to take six months and a large number of vehicles would be hauling contaminated soil out of the Site and bringing clean fill into the Site. The equipment required to perform the work is readily available. Sheeting and shoring may be required to excavate the contaminated soil at the property line. Handling of perched water and groundwater during the excavation process could present implementation problems if the water level is higher than anticipated or if the contaminants in the water require special handling. Also, worker exposures could pose implementation obstacles during excavation activities.

2.6.8 Cost

This cost is based on an assumption that 25% of the excavated soil would be classified as hazardous waste and 75% would be classified as non-hazardous and would be disposed in facilities accordingly to these classifications. The capital cost for construction of this Alternative is estimated to be $7,910,000. The 30-year present net worth including and annual OM&M cost of $0 is $7,910,000.

3.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

3.1 Introduction

In the following analysis, the alternatives are evaluated in relation to one another for each of the evaluation criteria (state and community acceptance would be addressed after the RI/FS has been released to the general public). The purpose of this analysis is to identify the relative advantages and disadvantages of each alternative.

3.2 Overall Protection of Human Health and the Environment

All of the alternatives, except Alternative 1 (No Action), provide adequate protection of human health and the environment. Risks through soil ingestion, inhalation, dermal contact, and volatilization to indoor air are reduced to cancer risks of less than 1×10^{-5}. The geosynthetic cap included as part of Alternatives 2 through 5 eliminates the potential risk from soil to groundwater leaching in the northwest corner of the site under future conditions. Current sampling shows that soil to groundwater leaching is not a present concern. The geosynthetic cap is a conservative approach taken to guard against changes in site conditions that could affect the mobility of contaminants in the soil in the northwest corner. Soil to groundwater leaching is not a concern for Alternative 6 as the contaminated soil above the action levels would be removed and disposed off-site.

3.3 Compliance with ARARs

The evaluation of the ability of the alternatives to comply with ARARs included a review of chemical-specific, location-specific, and action-specific ARARs that were presented earlier in this document. All of the alternatives, except Alternative 1 (No Action), would meet all of their respective ARARs.

3.4 Long-Term Effectiveness and Permanence

Alternative 6 provides the highest degree of long-term effectiveness and permanence for the onsite remedy because the contaminated soil is excavated and disposed of off-site. However, this benefit is mitigated by the increase risks associated with transportation and the offsite disposal location. Of the capping alternatives, Alternatives 2 and 3 both provide high degrees of long-term effectiveness and

permanence because the caps require little maintenance. Alternatives 4 and 5 would require more maintenance and would be less effective if not maintained.

3.5 Reduction of Toxicity, Mobility, and Volume

None of the Alternatives use any treatment technologies to reduce toxicity, mobility, or volume. For Alternatives 2 through 5, all of the contaminated soil is covered by a cap, which reduces mobility. The volatile and semi-volatile contaminants would naturally attenuate over time, which reduces toxicity and volume. For Alternative 6, the contaminated soil above the action limits would be removed from the Site and taken offsite for disposal.

3.6 Short-Term Effectiveness

The Remedial Action for Alternative 2 would be completed in the shortest amount of time, however the difference between the time to complete Alternatives 2 through 5 is negligible. Alternative 6 would take longer and would have greater short-term impacts during the construction and transportation activities, as the contaminated soil would be excavated for disposal off-site.

3.7 Implementability

Alternatives 2 through 5 would all be simple to install and to operate. Alternatives 3, 4, and 5 may be used as parking lots / storage areas. Alternatives 2 and 3 are easy to maintain. Depending on the use, the vegetation on the soil cap in Alternative 2 may need to be mowed or tended periodically during the growing season. The stone cap, Alternative 3, would only require maintenance if the thickness of the stone was disturbed (by unusual movement of a piece of equipment, etc.) or the filter fabric was damaged. These events are easily observed and responded to. Alternatives 4 and 5 require repairs of cracks that may develop in the asphalt (Alternative 4) or the concrete (Alternative 5) cap. The geosynthetic caps in Alternatives 2 through 5 require little maintenance except checking to ensure that the drainage outlet from the drainage layer is open and draining. The vegetated top surface would need to be maintained as discussed for the soil cap.

Alternative 6 requires the movement of a large number of vehicles to transport the contaminated soil off-site to the disposal location and to bring clean fill onsite as backfill. The movement of this large quantity of vehicles may be disruptive to the community. The excavation depth may be up to approximately 18 feet. This is possible but as excavation would probably be required up to the property line, sheeting and shoring of the excavations would be required. Handling of perched water and groundwater during the excavation process may also pose additional risks and implementation dilemmas for this alternative

3.8 Cost

Alternative 3, stone cap, has the lowest capital cost of the six alternatives. Alternative 6, excavation and disposal, uses an assumption that 25% of the soil would be classified and disposed as a hazardous waste and 75% would be classified and disposed as non-hazardous waste. Based on this assumption, this alternative is 10 times the cost of the other alternatives. If all of the waste is classified as a hazardous waste, the cost would be $24,000,000 (20 times the cost of the other alternatives).

TABLES

Table 1
Individual Evaluation of Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Soil Cap	Alternative 3 Stone Cap	Alternative 4 Asphalt Cap	Alternative 5 Concrete Cap	Alternative 6 Excavation and Disposal
OVERALL PROTECTIVENESS						
Human Health Protection						
Soil ingestion, inhalation, dermal contact	No reduction in risk	Cap reduces soil ingestion, inhalation, and dermal contact risk to less than 1×10^{-5}	See Alternative 2.	See Alternative 2.	See Alternative 2.	Soil excavation and disposal reduces soil ingestion, inhalation, and dermal contact risk on site to less than 1×10^{-5} but increases short term risk during excavation and transport.
Soil volatilization to indoor air	No reduction in risk	Cap reduces soil volatilization to indoor air risk to less than 1×10^{-5}	See Alternative 2.	See Alternative 2.	See Alternative 2.	Soil excavation and disposal reduces soil volatilization to indoor air risk to less than 1×10^{-5}
Environmental Protection	No reduction in risk	Cap provides protection to environment against contamination.	Cap provides protection to environment against contamination.	Cap provides protection to environment against contamination.	Cap provides protection to environment against contamination.	Excavation and disposal removes contamination source and protects the onsite environment.
COMPLIANCE WITH ARARS						
Chemical-Specific ARARs		Risk Assessment – RAGS-D and RAGS-E	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.

Table 1 (continued)
Individual Evaluation of Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Soil Cap	Alternative 3 Stone Cap	Alternative 4 Asphalt Cap	Alternative 5 Concrete Cap	Alternative 6 Excavation and Disposal
Location-Specific ARARs		River and Harbors Act of 1899 Clean Water Act (CWA) of 1977 Executive Order 11988 40 CFR 6 Deals with working in floodplain and disturbing surface waters.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
Action-Specific ARARs		Clean Air Act (40 CFR 61) and OAC 3745-20.	See Alternative 2.	See Alternative 2. Also "Asphalt Covers to Prevent Leaching at Industrial Sites" and "Use of Asphalt Covers over Contaminated Soil" (DERR-00-TDCE-001 and -004)	See Alternative 2.	See Alternative 2. Also Toxic Substances Control Act (TSCA) - 40 CFR Part 761. Department of Transportation regulations (49 CFR) and RCRA manifesting requirements.
Other Criteria and Guidance		OSHA and Ohio well abandonment regulations.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.

Table 1 (continued)
Individual Evaluation of Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Soil Cap	Alternative 3 Stone Cap	Alternative 4 Asphalt Cap	Alternative 5 Concrete Cap	Alternative 6 Excavation and Disposal
LONG-TERM EFFECTIVENESS AND PERMANENCE						
Magnitude of Residual Risk						
Soil ingestion, inhalation, dermal contact	Source has not been removed. Existing risk will remain.	Risk eliminated as long as cap is maintained. Because source is only contained, inherent hazard of waste remains.	See Alternative 2.	See Alternative 2.	See Alternative 2.	Onsite residual risk eliminated after removal of source.
Soil volatilization to indoor air	Source has not been removed. Existing risk will remain.	Risk eliminated as long as cap is maintained. Because source is only contained, inherent hazard of waste remains.	See Alternative 2.	See Alternative 2.	See Alternative 2.	Onsite residual risk eliminated after removal of source.
Adequacy and Reliability of Controls	No controls over remaining contamination. No reliability.	Soil cap controls contaminated soil. Geosynthetic cap controls contaminated soil (including infiltration). The reliability of the caps can be high if maintained.	Stone cap controls contaminated soil. Geosynthetic cap controls contaminated soil (including infiltration). The reliability of the caps can be high if maintained.	Asphalt cap controls contaminated soil. Geosynthetic cap controls contaminated soil (including infiltration). The reliability of the caps can be high if maintained.	Concrete cap controls contaminated soil. Geosynthetic cap controls contaminated soil (including infiltration). The reliability of the caps can be high if maintained.	Source material is removed, leaving no contamination onsite above the action level established for the clean-up. High reliability.

Table 1 (continued)
Individual Evaluation of Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Soil Cap	Alternative 3 Stone Cap	Alternative 4 Asphalt Cap	Alternative 5 Concrete Cap	Alternative 6 Excavation and Disposal
Need for 5-Year Review	Review would be required to ensure adequate protection of human health and the environment is maintained.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	None required as source has been removed.
REDUCTION OF TOXICITY, MOBILITY OR VOLUME						
Treatment Process Used	None.	None.	None.	None.	None.	None.
Statutory Preference for Treatment	Does not satisfy.	Does not satisfy.	Does not satisfy.	Does not satisfy.	Does not satisfy.	Does not satisfy.
SHORT-TERM EFFECTIVENESS						
Community Protection	Risk to community not increased by remedy implementation.	Temporary increase in dust production during building demolition and cap installation. Some regrading of surface contaminated soils primarily in NW corner and on river bank.	See Alternative 2.	See Alternative 2.	See Alternative 2.	Considerable increase in dust production during building demolition and soil excavation and backfill. Vehicles hauling contaminated soil will be driven through community.

Table 1 (continued)
Individual Evaluation of Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Soil Cap	Alternative 3 Stone Cap	Alternative 4 Asphalt Cap	Alternative 5 Concrete Cap	Alternative 6 Excavation and Disposal
Worker Protection	No significant risk to workers.	Protection required against ingestion, inhalation, and dermal contact of contaminated dust during cap construction.	See Alternative 2.	See Alternative 2.	See Alternative 2.	Protection required against ingestion, inhalation, and dermal contact of contaminated dust during excavation.
Environmental Impacts	Continued impacts from existing conditions	Impacts immediately eliminated by construction of cap.	See Alternative 2.	See Alternative 2.	See Alternative 2.	Impacts immediately eliminated by removal of source soil.
Time Until Action is Complete	Not applicable	Construction of the cap is estimated to take 3 months.	Construction of the cap is estimated to take 4 months.	Construction of the cap is estimated to take 4 months.	Construction of the cap is estimated to take 4 months.	Construction activities are estimated to take 6 months.
IMPLEMENTABILITY						
Ability to Construct and Operate	No construction or operation.	Simple to operate and construct. Requires about 11,500 CY of common fill placed across Site.	Simple to operate and construct. Requires about 8,600 SY of filter fabric and stone placed across Site.	Simple to operate and construct. Requires about 8,600 SY of stone base and asphalt placed across Site. Asphalt Requires Repair	Simple to operate and construct. Requires about 8,600 SY of stone base and concrete placed across Site. Concrete cracks would require repair.	Construction requires movement of large number of vehicles through community transporting contaminated soil and clean fill back and forth. No operation requirements.

Reuse component

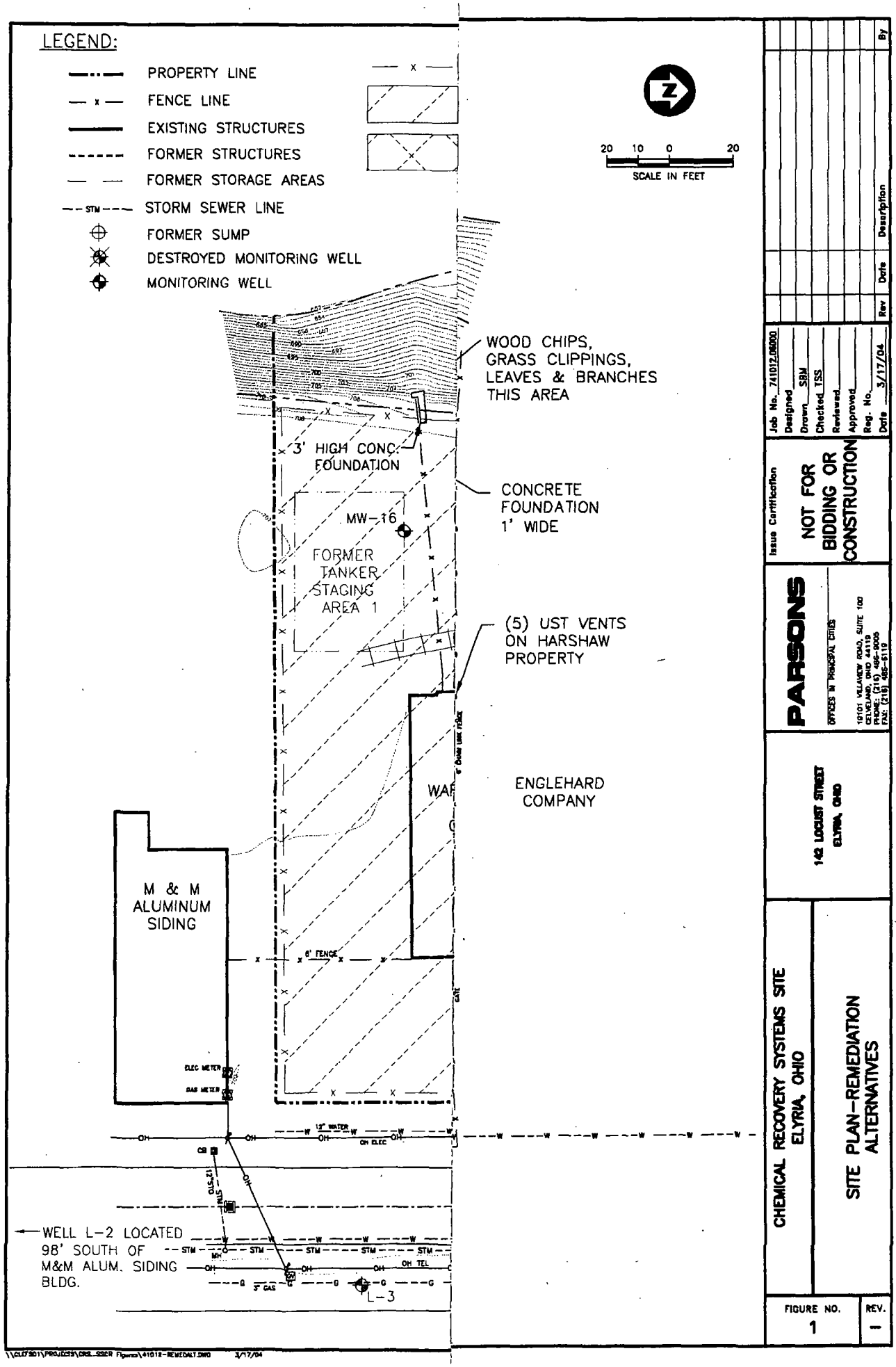
Table 1 (continued)
Individual Evaluation of Alternatives

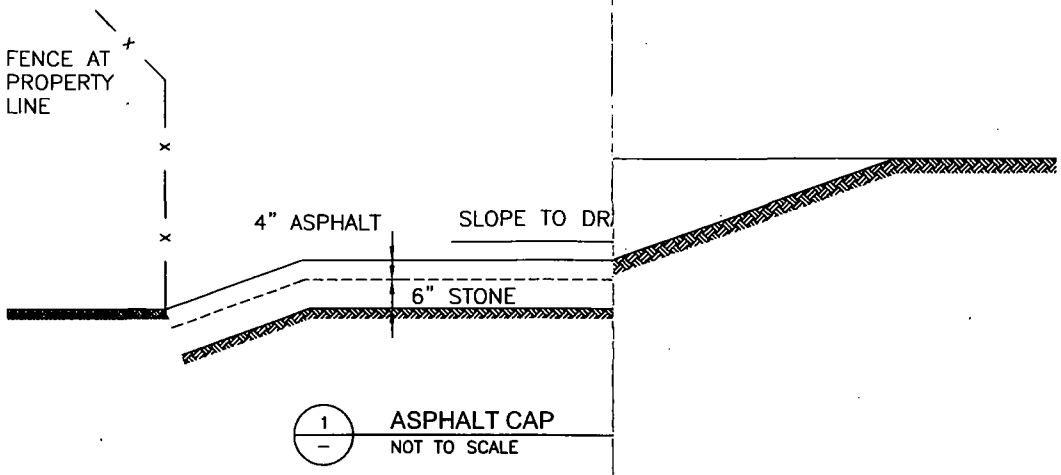
Criteria	Alternative 1 No Action	Alternative 2 Soil Cap	Alternative 3 Stone Cap	Alternative 4 Asphalt Cap	Alternative 5 Concrete Cap	Alternative 6 Excavation and Disposal
Ease of Doing More Action if Needed	If monitoring indicates more action is necessary, may need to go through the FS/ROD process again.	This action does not prohibit the implementation of additional actions.	See Alternative 2.	See Alternative 2.	See Alternative 2.	See Alternative 2.
Ability to Monitor Effectiveness	No monitoring.	Cap is out in the open and can be readily monitored for signs of failure before significant exposure occurs.	See Alternative 2.	See Alternative 2.	See Alternative 2.	No monitoring required.
Ability to Obtain Approvals and Coordinate with Other Agencies	No approvals necessary.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1. Must obtain approval/coordinate the disposal location. If the disposal location is out of state, Respondents shall provide written notice pursuant to AOC ¶ 73 to the receiving state environmental director and to the USEPA Project Coordinator.

Table 1 (continued)
Individual Evaluation of Alternatives

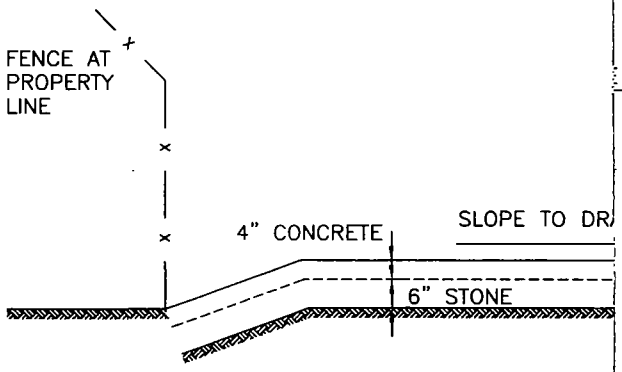
Criteria	Alternative 1 No Action	Alternative 2 Soil Cap	Alternative 3 Stone Cap	Alternative 4 Asphalt Cap	Alternative 5 Concrete Cap	Alternative 6 Excavation and Disposal
Availability of Services and Capacities	No services or capacities required.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.	See Alternative 1.
Availability of Equipment, Specialists, and Materials	None required.	All equipment and cap materials readily available.	See Alternative 2.	See Alternative 2.	See Alternative 2.	Excavation and backfill equipment is readily available. Fill material is readily available.
Availability of Technology	None required.	Cap technology readily available.	See Alternative 2.	See Alternative 2.	See Alternative 2.	Excavation and backfill technology readily available.
COST						Assumes 25% of soil hazardous waste
Capital	$0	$762,000	$746,000	$776,000	$822,000	$7,910,000
First Year Annual O&M Cost	$0	$50,000	$43,000	$50,000	$50,000	$0
Present Worth Cost (2)	$0	$1,325,000	$1,230,000	$1,339,000	$1,385,000	$7,910,000 (3)

Notes:
1. Alternatives 2 through 5 include deed restrictions, fencing, and a geosynthetic cap in the northwest corner of the Site. The remainder of the Site has the type of cap indicated.
2. Present worth costs are based on 30 years of OM&M and an interest rate of 8 %.
3. Alternative 6 assuming 100% of excavated soil is hazardous waste would cost $24,000,000.

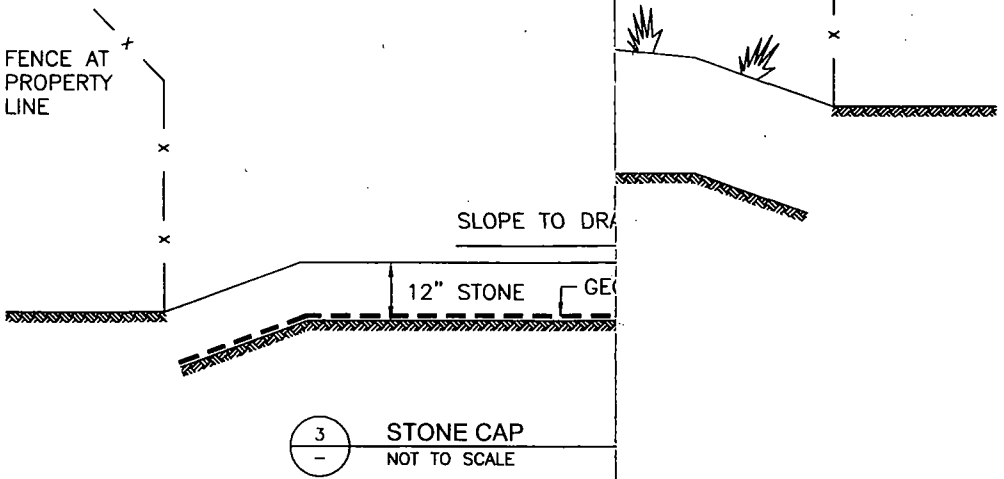

LEGEND:
PROPERTY LINE
FENCE LINE
EXISTING STRUCTURES
FORMER STRUCTURES
FORMER STORAGE AREAS
STORM SEWER LINE
FORMER SUMP
DESTROYED MONITORING WELL
MONITORING WELL
20 10 0 20
SCALE IN FEET
WOOD CHIPS, GRASS CLIPPINGS, LEAVES & BRANCHES THIS AREA
3' HIGH CONC. FOUNDATION
CONCRETE FOUNDATION 1' WIDE
MW-16
FORMER TANKER STAGING AREA 1
(5) UST VENTS ON HARSHAW PROPERTY
ENGLEHARD COMPANY
M & M ALUMINUM SIDING
6' FENCE
GATE
ELEC METER
GAS METER
12" WATER
OH ELEC
OH TEL
12"STM
3" GAS
WELL L-2 LOCATED 98' SOUTH OF M&M ALUM. SIDING BLDG.
L-3
Job No. 741012.04000
Designed
Drawn SBM
Checked TSS
Reviewed
Approved
Reg. No.
Date 3/17/04
Issue Certification
NOT FOR BIDDING OR CONSTRUCTION
PARSONS
OFFICES IN PRINCIPAL CITIES
CHEMICAL RECOVERY SYSTEMS SITE
ELYRIA, OHIO
SITE PLAN-REMEDIATION ALTERNATIVES
FIGURE NO. 1
REV. 1



1 — ASPHALT CAP
NOT TO SCALE



2 — CONCRETE CAP
NOT TO SCALE



3 — STONE CAP
NOT TO SCALE

By	Description	Date	Rev

Job No. 741012.06000
Designed
Drawn SBM
Checked TSS
Reviewed
Approved
Reg. No.
Date 3/17/04

Issue Certification

NOT FOR BIDDING OR CONSTRUCTION

PARSONS
OFFICES IN PRINCIPAL CITIES
19101 VILLAVIEW ROAD, SUITE 100
CLEVELAND, OHIO 44119
PHONE: (216) 486-9005
FAX: (216) 486-8119

142 LOCUST STREET
ELYRIA, OHIO

CHEMICAL RECOVERY SYSTEMS SITE
ELYRIA, OHIO

TYPICAL CAP DETAILS

FIGURE NO. 2

REV. —